Direct - To

Purpose:
- Improve airspace efficiency and facilitate flying time savings for airspace users.
- Provide advisories for traffic conflicts and wind-favorable direct routes.
- Provide a rapid-feedback user interface, fully integrated with R-Side display.
- Analyze conflicts, flying time, special use airspace, and preferential routes.

Users:
En route radar controllers

Field Sites:
Fort Worth ARTCC (ZFW)

Operational Results:
- Operational evaluation at ZFW with auxiliary displays in May/June 2001 demonstrated positive controller feedback and validated reduction in flying time.
- National controller team evaluations of R-Side prototypes in April and September 2002

Future:
Follow-on R-Side evaluations planned for January 2003.

Overview

Direct-To (D2) is a decision-support tool for en route radar controllers which helps improve airspace efficiency, simplifies the analysis and input of route and altitude changes, and facilitates flying-time savings for airspace users. D2 continuously analyzes all aircraft for potential traffic conflicts and for wind-favorable direct routing ("direct-to") opportunities. Conflict advisories and direct-to route advisories are provided with minimal additional impact to the controller's display; information is added to the full data block and can be accessed through optional lists. A highly-automated trial planning function allows controllers to quickly visualize, evaluate, and input route and altitude amendments. D2 research is supported by NASA's Airspace Systems Program.

System Description

D2 is based on the Center-TRACON Automation System (CTAS) trajectory analysis methodology and software. CTAS computes 4-dimensional trajectory predictions for all aircraft based on radar track and flight plan data from the ARTCC (Center) Host, atmospheric data from the National Weather Service and aircraft performance models. All trajectory predictions are recomputed with every 12-sec. radar track update, periodic flight plan updates, and hourly atmospheric data updates. Traffic conflict and direct route advisories are recomputed every 6 seconds. Trial plan status information (conflict, flying time, special use airspace, preferential routing) is updated every second.

Direct route advisories are based on a wind-route algorithm that continuously analyzes all aircraft in the system and identifies those that can save at least one minute in flying time by flying direct to a downstream fix on their route of flight. Route advisories are constrained to prevent significant deviation from the planned route of flight. The wind-route algorithm is also activated whenever the trial planner is utilized for any aircraft, which allows the controller and pilot to consider the effect on flying time when evaluating a route change.

User Interface

D2's functionality is fully integrated with the R-Side traffic situation display. Track-ball clicks are used to: display a graphical depiction of potential conflict geometry, activate a trial-planning function, or activate an altitude probe. The trial-planning function graphically displays the route with an analysis of potential traffic conflicts, special use airspace, preferential routes, and flying time. The controller can then use the trial planner to modify the route easily by a point-and-click action and either select a different fix or add an auxiliary waypoint, and then input the flight plan amendment to the Host computer. The altitude probe computes and displays the conflict status for all relevant climb- (or descend-) and-maintain trajectories.

Operational Evaluations

Over 50 controllers from 9 Centers have participated in the development of D2, which was first operationally tested using auxiliary displays at Denver Center in 1997 as the Conflict Probe/Trial Planner. More recent evaluations at ZFW were conducted in November 1998 and May/June 2001. Efforts are currently underway to implement the D2 functionality on the DSR R-Side traffic display; this implementation is being evaluated by a national controller team including representatives from Air Traffic's Conflict Probe Team and DSR Evolution Team. R-Side simulations were conducted at the FAA's William J. Hughes Technical Center in April and September 2002 and additional simulations are scheduled for January 2003. Operational results show a potential for saving 900 minutes per day in flying time if D2 were operational throughout Fort Worth ARTCC (ZFW). Simulation data show similar potential savings nationwide.